Illinois Department of Transportation
2300 South Dirksen Parkway / Springfield, Illinois / 62764

BDE PROCEDURE MEMORANDUM

NUMBER: 27-02

SUBJECT: Temporary Concrete Barrier

DATE: July 1, 2002

Background

Crash testing criteria for highway safety features was previously detailed under National Cooperative Highway Research Program (NCHRP) Report 230 (Published 1980). This report recommended testing and using NCHRP Report 230 devices but did not require their use. In 1993, the Transportation Research Board issued NCHRP Report 350 "Recommended Procedures for the Safety Performance Evaluation of Highway Features". The purpose of this report was to present uniform guidelines for the crash testing of both permanent and temporary highway safety features and recommended evaluation criteria to assess test results. This report provided six test levels. Test Level 3 using an 1800 lb. (820 kg) car and 4400 lb. (2000 kg) pickup truck at 60 mph (100 km/h) is considered the basic test level. FHWA adopted the NCHRP Report 350 as a national guideline and initially required all devices, both permanent and temporary, used on the National Highway System to meet these guidelines effective October 1, 1998.

As relatively few temporary concrete barriers met these test requirements, FHWA in an agreement with AASHTO and ARTBA provided for a phase-in of increasingly stringent requirements. As of October 1, 2000 all temporary concrete barrier was required to transfer both moment and tension between segments in addition to meeting Report 230 guidelines. The existing State Standard 704001 meets these requirements and has continued to be produced and installed. The connection used in Illinois's New Jersey barrier along with four other connections meeting the combined criteria were identified in the AASHTO Roadside Design Guide as "Tested and Operational."

However, to meet federal requirements as of October 1, 2002, any <u>new</u> temporary concrete barrier used must meet NCHRP Report 350 Test Level 3 guidelines. Existing barriers meeting the 230 testing requirements may be used during a phase out period as long as they remain serviceable. As noted above, Illinois's New Jersey barrier is approved for use for a period of time as it's connection is one of the five identified in the AASHTO Roadside Design Guide as "Tested and Operational"; however, it does not meet NCHRP 350 Test Level 3.

The shape of the temporary concrete barrier plays a role in safety performance. In crash tests, the F-shape has proven to be the most successful in reducing the lift of vehicles and in preventing rollover of smaller vehicles. Illinois will begin using the F-shape barrier in a configuration approved under NCHRP Report 350 Test Level 3.

This Procedure Memorandum is intended to provide guidance for the usage of temporary concrete barrier on State Highways in Illinois.

Applicability

The procedures in this memorandum are applicable to all State Highway projects.

Procedures

The following procedures establish design guidelines for use of temporary concrete barrier.

Temporary concrete barriers are widely used in work zones to shield motorists as well as workers. The impact performance of the barrier depends, among other factors, on segment length and mass, the manner in which segments are joined, the joint rotation, and the manner in which segments are anchored.

The new Illinois F-shape barrier dimensions are not the same as the existing New Jersey shape. The length and width of the new barrier will be 12.5 ft. (3.8 m) and 22.5 in. (570 mm), respectively. These dimensions will need to be considered during the design process. Related Standards will also be updated to reflect the new length. All NCHRP 350 temporary concrete barriers were tested on bare pavement. Therefore, Styrofoam shall not be used with the new Illinois F-shape barrier but will continue to be required with the existing New Jersey barrier.

The barrier unit at each end of the installation shall be anchored to the pavement to prevent overturning and lateral deflections greater than those obtained during the NCHRP 350 tests. The terminal section will no longer be allowed for use with either the New Jersey or the F-shape barriers. The approach end(s) of the temporary barriers shall be protected with a NCHRP 350 Test Level 3 approved device such as a multiple array of sand filled plastic barrels or a Type 3, Special Terminal. Single barrel arrays are not approved for use. Consideration should be given to the frequency of nuisance hits and to protecting the construction hazard and workers when selecting the appropriate crash cushion. If the speeds warrant the use of a NCHRP 350 Test Level 2 approved device (45 mph [70 km/h] or less), the designer shall state such in the Special Provisions.

A minimum offset of 2 ft. (600 mm) from the travel lane to the temporary concrete barrier is desirable. When lateral displacement of the barrier cannot be tolerated, it may be necessary to anchor the barrier to the underlying

surface to prevent lateral movement. At locations where a hazard exists within 3.5 ft. (1.1 m) of the temporary concrete barrier, the barrier shall be anchored to the pavement. The designer should state in the plans or special provision when the barriers need to be anchored.

FHWA is allowing the use of any previously existing temporary concrete barrier that meets Report 230 for the duration of the barrier's service life. In an agreement with FHWA, the Department has set a phase out date of January 1, 2008. Existing New Jersey barrier can be used through the completion of a project past the phase out date. When existing temporary New Jersey barrier is in place and used as a permanent installation, the barrier may continue to remain in place until the next rehabilitation project as long as it is in good condition and does not have a history of frequent hits. The "Quality Standard for Work Zone Traffic Control Devices" by the Bureau of Operations shall be used to determine if existing barrier is considered suitable for use. Mixing of the existing New Jersey barrier and the F-shape barrier will not be permitted in a continuous run of barrier.

When specifying State owned barrier, the designer should state in the plans or special provisions where the storage site is located. The plans should also include a statement to indicate where the barriers are to be returned at the completion of the project. In addition, we should state what we will provide. The State typically provides the barrier and connecting pins.

Engineer of Design and Environment